PATENT SPECIFICATION

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PROVISIONAL SPECIFICATION

Improvements in or relating to Conveyor Systems

We, GEO. W. KING, LIMITED, a British Company, of Hartford Works, Hitchen, in the County of Hertford, and DONALD MAYER KING, a subject of the King of Great Britain, of the aforesaid Company's address, do hereby declare the nature of this invention to be as follows:—

This invention relates to conveyor systems and has for an object a system whereby loading and unloading or, in the case of a system comprising a number of separate conveyors extending in the same or different directions through, for example, a workshop or factory, the transfer of a load from one conveyor to another, may be readily effected or facilitated.

A conveyor system in accordance with the invention comprises a carrier, trolley or the like for supporting a load on a main conveyor or conveyor track, an auxiliary conveyor on said carrier, and means for automatically causing said auxiliary conveyor to feed a load to or discharge a load from, said carrier at a predetermined position along the path of travel of said main conveyor or along said conveyor track.

The main conveyor, which may be of any known or desired kind, for example, a chain, belt or cable conveyor and which may etxend along the floor of a workshop or factory or may be arranged in an overhead position, is preferably of the endless kind, passing about suitable driving and idler pulleys or rollers. The load carriers or trolleys may be arranged at regularly spaced intervals along the main conveyor and each carrier may consist of a frame or cradle in which is supported, as by means of suitable wheels or rollers, an auxiliary conveyer which also is preferably of the endless kind and of which preferably the upper run constitutes a load-supporting platform.

The means for effecting loading or unloading of the carriers is preferably automatic and is rendered operative, on preselection by the operator, as the carrier approaches or reaches the desired loading or unloading station. For example, the main conveyor may serve six stations and it may be desired to load one carrier at the first station, another at the second station and still another at the third station, each of these carriers being unloaded at one or other of the remaining stations.

Loading and unloading of the carriers may be controlled by mechanical, electrical or hydraulic means or by any suitable combination thereof. For example, each of the carriers may be provided with a wheel which, as the carrier approaches a pre-selected loading or unloading station, engages a track portion by which the wheel is caused to rotate. This rotary motion may be imparted to the auxiliary carrier conveyor through appropriate gearing to drive said auxiliary conveyor. Both the track portion and the wheel may be adjustable either laterally or in other appropriate direction to provide the required degree of selectivity in the control of the carrier.

Instead of the aforesaid track and wheel arrangement for driving the auxiliary conveyors, each carrier may be fitted with an electric motor to which current is supplied from a bus bar which is insulated from the collector except over that section at which loading or unloading of the carrier is to take place. These carrier motors may, furthermore, be arranged to drive the carriers, the bus-bars in this case being continuous and selector controlled clutches or the like being provided to couple the motors to the auxiliary conveyors at the appropriate positions in the travel of the carriers and, if desired, simultaneously to disconnect the drive to the carriers. If desired, each carrier may have a pair of separate motors, one driving the carrier and the other actuating the auxiliary conveyor.

Where each of the carriers is individually driven either by the auxiliary conveyor driving motor or by a separate motor, the advantage is obtained that each carrier may be stopped for loading

or unloading at an accurately predetermined position without effecting the positions or the travel of other carriers. Any convenient means such as trip dogs or the like operating in conjunction with the auxiliary conveyors may be provided for controlling the travel of the carriers. In this case a main conveyor is not required, the carriers being arranged to run on a fixed endless track.

Where a main conveyor is provided the carriers may be secured thereto and the conveyor may be either continuously or intermittently driven. This arrangement with an intermittent drive for the carriers may be more suitable where the loading and/or unloading stations are equidistantly spaced along the run of the conveyor than where these stations are positioned at irregular intervals. In the case of a continuously driven conveyor, which may be more applicable with irregularly spaced stations, each carrier may be arranged so that, when it reaches the appertaining station its movement is temporarily arrested without, however, stopping the conveyor. This may be effected by freely supporting the carriers on conveyor chains, rollers or the like, operator-controlled abutments or dogs being provided along the path of travel of the carriers to arrest the latter at the desired positions.

The several loading and/or unloading stations may be arranged at either side of the main conveyor or conveyor track or at both sides thereof, this latter arrangement necessitating the provision of means for driving the auxiliary carrier conveyors in either direction. In the case of a friction wheel and stationary track drive as previously described, the direction of movement of each auxiliary conveyor may be controlled by positioning the corresponding track portion to contact the wheel at one or other of a pair of diametrically opposite points. In the case of individually electrically driven carriers, the motors may be of the reversible type.

Instead of providing sectionalized bus bars for supplying the current for driving the auxiliary carrier conveyors, a single bus bar may be provided which is non-insulated throughout its length and is formed with movable portions adapted to engage current collectors on the motors at the appropriate times. Alternatively, the collectors may be adjustable to provide for selection in the operation of the auxiliary conveyors.

The auxiliary carrier conveyors may be of any desired construction. They may, for example, comprise endless bands or may be in the form of rollers supported between a pair of endless driving chains.

In addition to the provision of loading and/or unloading stations at opposite sides of the main conveyor or conveyor track, similar stations may be provided for both the upper and lower runs of the conveyor, means of any suitable kind being provided for preventing tipping of the carriers while passing from one conveyor run to the other. This arrangement enables two or more floors of a workshop to be served by the same conveyor.

In addition to providing for normal unloading and/or loading operations employing a single main conveyor or conveyor track, the system in accordance with the invention may be extended to embody a plurality of main conveyors or conveyor tracks extending either horizontally or vertically or both horizontally and vertically and may be so arranged in relation to one another as to provide a single conveyor system serving an entire floor space or concurrently serving two or more floors, or alternatively serving as an elevator. Conveyors on different floor levels may alternatively be interconnected by automatically operated vertical lift sections. Successive sections of a uni-directional conveyor may be staggered or may be in line with small conveyors at one side adjacent the ends of said sections.

In addition to a conveyor system having automatic loading and unloding means which may be adjusted or re-set as desired, the invention provides a system by which tipping of the carriers or loads may be avoided, thereby enabling the same to be employed with particular advantage in the handling of liquids. To this end either the upper or lower run of the or each main conveyor or conveyor track is so positioned in relation to the loading and unloading stations and to adjacent conveyors or conveyor tracks that loads may be moved or transferred horizontally or substantially horizontally, rollers or the like being, if necessary, provided to support the loads during such movement.

Where the invention is to be applied to overhead conveyors, the auxiliary conveyor is supported in a frame suspended from a trolley running, for example, on an I-section joist. The auxiliary conveyor may be provided, for example, with a depending wheel or the like which is adapted to enter between a pair of spaced and suitably shaped track members which may be flared at the forward end and by which the desired movement of the auxiliary conveyor is effected. Any other form of driving arrangement previously described may, however, be employed.

Dated this 23rd day of June, 1944.

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COMPLETE SPECIFICATION

Improvements in or relating to Conveyor Systems

We, GEO. W. KING, LIMITED, a British Company, of Hartford Works, Hitchen, in the County of Hertford, and DONALD MAYER KING, a subject of the King of Great Britain, of the aforesaid Company's address, do hereby declare the nature of this invention and in what manner the same is to performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to conveyor systems and has for an object a system whereby loading and unloading or, in the case of a system comprising a number of separate conveyors extending in the same or different directions through, for example, a worshop or factory, the transfer of a load from one conveyor to another, may be readily effected or facilitated.

In accordance with the present invention a conveyor system comprises a main conveyor which includes load-supporting carriers, trolleys or the like which are constrained to travel along a predetermined path, an auxiliary conveyor of the endless type associated with each of said carriers trolleys or the like and disposed transversely with respect to the direction of travel of the latter and means for automatically operating each auxiliary conveyor to feed a load thereto, or discharge a load therefrom at preselected positions along the path of travel of said main conveyor.

In carrying the invention into effect, the main conveyor, which may be of any known desired kind, for example a chain, belt or cable conveyor and which may extend along the floor of a workshop or may be arranged in an overhead position, is preferably of the endless kind, passing about suitable driving and idler sprockets or pulleys. The load carriers or trolleys are preferably arranged at regularly spaced intervals along the main conveyor and each carrier may consist of a frame secured to said latter conveyor and on which an auxiliary conveyor is supported as by means of suitable wheels or rollers.

Automatic operation of the auxiliary conveyors as each carrier reaches a predetermined position in the travel of the main conveyor may be effected in a number of different ways. For example, each auxiliary conveyor may be driven by a chain or cable which in turn is actuated under control of a ramp arranged in the general direction of travel of the main conveyor and adapted to be engaged by a projection on the auxiliary conveyor driving chain. Alternatively, each auxiliary conveyor may be driven by an electric motor which is set in operation at the appropriate time by means, for example, of switch gear arranged along the main conveyor track in the path of the load carriers or other appropriate electrical equipment.

Each of the load carriers is preferably equipped with selector means by which the station or position of operation of the corresponding auxiliary conveyor is determined. Where the main conveyor is arranged to discharge or receive loads at either side thereof, each carrier may also be fitted with selector mechanism, which may, if desired, be combined with the station selector mechanism, to determine the direction of movement of the auxiliary conveyor.

Reference herein to the main conveyor is intended to include a conveyor track along which the carriers are driven, for example, by individual electric motors mounted on said carriers, and with an arrangement of this kind the said motors may also be arranged to actuate the auxiliary conveyors. Alternatively, separate motors may be provided on each carrier to effect these operations.

Where it would be desired to transfer loads from, for example, a main conveyor to a branch conveyor extending at right-angles to the main conveyor, intermediate carrier wheels or rollers are preferably provided adjacent the ends of the branch conveyors to bridge the spaces between said latter conveyors and the adjacent ends of the auxiliary conveyors, said bridging wheels or rollers being suit-

ably driven in synchronism with the associated branch and auxiliary conveyors.

In order that the invention may be clearly understood and readily carried into effect, several embodiments thereof will hereinafter be more fully described with reference to the accompanying drawings, in which:

Figure 1 is a side elevation of a part of a conveyor showing one of the load carriers or trolleys;

Figure 2 is an end view of Figure 1;

Figure 3 is a plan view of Figure 2;

Figure 4 is a detail side view on a larger scale of a part of a load carrier fitted with one form of mechanical selector mechanism;

Figure 5 is an end view of a part of a load carrier fitted with the selector mechanism of Figure 4;

Figure 6 is a plan view of Figure 5;

Figure 7 is a diagrammatic illustration of the auxiliary conveyor control track;

Figure 8 is a detail perspective view of part of the selector mechanism shown in Figures 1 to 6;

Figure 9 is a diagrammatic detail side elevation showing additional features of the main conveyor;

Figure 10 is a diagrammatic view illustrating a modified auxiliary conveyor arrangement;

Figure 11 is a plan view of Figure 10;

Figures 12 and 13 are side and end elevational views respectively showing diagrammatically a further modification of the conveyor system;

Figure 14 is a diagrammatic side elevation of one form of electrically operated conveyor system according to the invention;

Figure 15 is an end view of Figure 14; and

Figure 16 is a wiring diagram showing the control arrangements for the embodiment of the invention illustrated in Figures 14 and 15.

Referring now to the drawings and firstly to Figures 1 to 3 thereof, the main conveyor here shown comprises a pair of laterally spaced chains 10, 10 which are suitably of the conventional endless kind and pass at opposite ends around guide sprockets (not shown). These main conveyor chains may be driven in any desired manner, for example, by synchronized electric motors arranged at intervals along the run of the conveyor. The conveyor chains and sprockets may alternatively be replaced by cables and pulleys or any other appropriate system.

Secured to the chains 10 at suitable intervals therealong are a plurality of load carriers or trolleys (one only being shown in Figures 1, 2 and 3) generally designated by the numeral 11. Each carrier is formed of pairs of longitudinal side frame members 12, 12 of channelled cross-section interconnected at opposite ends by similarly sectioned transverse end frame members 13, 13. Wheels or rollers 14, 14 are rotatably supported at opposite ends of the pairs of longitudinal frame members 12, 12 and are intended to run on tracks 15, 15. The wheels 14 are of the flanged kind and those at one end of the carrier are, as shown, preferably oppositely arranged relatively to those at the other end.

Journalled in bearings 16, 16 at opposite sides of the carrier are a pair of cylinders or drums 17 about which pass an endless band 18 of a width not substantially less than the length of the carrier frame. The upper run of the band 18 constitutes a movable platform on which the loads are supported and for this purpose the said upper run passes at intervals over longitudinally extending supporting rollers 19 which are journalled in upper end frame members 20, 20 supported by uprights 21, 21 secured to the transverse frame members 13, 13. A conveyor-tensioning roller 22 is adjustably supported in brackets 23, 23 carried by the end frame members 13, 13 to engage the lower run of the conveyor band 18.

If it be assumed that the main conveyor serves a line of stations from and to which goods are to be moved or transported, said stations being arranged along each side ofthe conveyor, it will be understood that when a carrier reaches a station to which a load is to be delivered or from which a load is to be removed, the carrier conveyor 18 must be driven in the appropriate direction to effect the desired movement of the load. Furthermore, if this movement of the load is to be effected without stopping the main conveyor, it will also be understood that such movement must be accurately synchronized with the travel of the main conveyor. Figures 4, 5 and 6 show by way of example one form of mechanical control for automatically actuating the load carrier conveyor 18 to deliver loads to or pick up loads from stations at the side of the main conveyor. As here shown, this actuating mechanism broadly consists in the provision of a laterally movable member the movement of which is effected by its engagement with a fixed cam rail extending longitudinally of the main conveyor and which is so interconnected with the auxiliary conveyor as to drive the latter in one or other direction in accordance with the contour of said cam rail. More specifically, this actuating mechanism comprises a chain 25 (Figures 1, 2

and 3) passing around sprocket wheels 26, 26 journalled in one of the carrier end frame members 13 and also about a chain wheel 27 rotatable about the axis of one of the drums 17 supporting the auxiliary conveyor 18. Attached to the lower run of the chain 25 is a carriage 26 (Figures 4, 5 and 6) fitted with wheels or rollers 29, 29 arranged to run on tracks, 30, 30 secured to the carrier frame and extending laterally thereof. Rotatably mounted on the carriage 28 is a depending roller 31 arranged to run within a channelled track or rail 32 which extends longitudinally of the main conveyor between the rails 15. As shown in Figure 7, this track is arranged generally centrally between the rails 15 and at intervals throughout its length is divided into two oppositely deflected portions 33, 34 along either of which the roller 31 is caused to move, as will later be described, during longitudinal feed of the conveyor. These track portions 33, 34 determine the direction of lateral travel of the carriage 28 and therefore of the chain 25 and the auxiliary conveyor 18 and correspond to the several loading and unloading stations served by the conveyor. Four of such stations, numbered respectively LI RI, LII RII, LIII RIII, and LIV RIV are shown in Figure 7 at each side of the conveyor run and it will be evident that the direction of movement of the auxiliary conveyor at each of these stations will be initially determined by whichever of the track sections 33, 34 is traversed by the roller 31.

For the purpose of directing the roller 31 into the appropriate track section 33 or 34 for any station, a pivoted gate 35 (Figure 6) is provided in the track 32 at the junction of said track with the leading ends of each pair of sections 33, 34. Each gate 35 is adapted to assume one or other of two extreme positions to deflect the roller 31 into one or other of the track portions 33, 34 under urge of a compressed spring 36 anchored at one end to a fixed pin 37 and connected at its other end at 38 to a tail portion 39 of the gate. Also connected at 38 to the gate tail is one end of a link 40 the other end of which is pivotally attached at 41 to an arm 42 rigid with a centrally pivoted trip lever 43 mounted adjacent one of the tracks 15. As shown in Figure 5, the two ends of the trip lever 43 are bent upwardly to form diametrically opposed horizontal portions 44 one or other of which is adapted to be engaged by one of a pair of depending pins 45, 46 carried by the two arms of a right-angled bell crank lever 47 positioned at the front of the carrier. This bell crank lever is secured to the lower end of a vertical spindle 48 which at its upper end carries a sleeve 49 (Figure 8) axially but non-rotatively movable relatively to the spindle. Integral or otherwise rigid with the sleeve 49 is a manually operable knob or wheel 50 between which and a nut 51 threaded on the upper end of the spindle 48 is a compression spring 52. The sleeve 49 carries a radially outwardly projecting keeper 53 which is adapted to seat within one or other of a pair of recesses or notches 154, 155 formed in the flanged periphery of a quadrant 156 secured to a suitable adjacent part of the carrier. Thus by lifting the knob upwardly against the pressure of the spring 52 and turning it in the required direction, one of the pins 45, 46 will be positioned to engage one of the end portions 44 of the trip lever 43 and thereby set the gate 35 to open one of the track portions 33, 34 and close the other. It will be understood that this directional drive control for the auxiliary conveyors is set at each station during the passage therethrough of the carriers.

In addition to this directional control for the auxiliary conveyors, it is necessary to provide for selection of the station at which each auxiliary carrier is operated to pick up or discharge a load. For example, if a carrier is required to collect a load at station RIV (Figure 7), in addition to driving the carrier conveyor in the required direction at this station, provision must be made for neutralizing the drive from the roller 31 to the conveyor 18, irrespective of which track portion 33 or 34 is traversed by the roller 31 at the other stations RI, RII and RIII. For this purpose the drive from the chain wheel 27 is transmitted to the auxiliary conveyor 18 by a clutch which is adapted to be automatically engaged, by means now to be described, only while the carrier is passing the selected operative station i.e. station RIV in the example given above.

The clutch and associated actuating mechanism is illustrated in Figures 4, 5 and 6. As shown the clutch is of the dog type comprising a disc 55 integral with the chain wheel 27 and formed with an annular series of apertures 56, for example, three, and a second disc 57 having a corresponding number of axially projecting studs 58 adapted to engage within the apertures 56, the disc 55 being free on the shaft 59 carrying one of the drums 17 and the disc 57 being fixed to said shaft for rotational movement therewith while being free to slide axially thereon. Co-operating with a collar rigid with the disc 57 is a forked shift lever 60 pivotally

mounted intermediate its ends at 61 in a bracket 62 on the carrier frame. At its lower end the shift lever 60 is connected by a pin and slot connection to a slidable plate like member 60 which is formed with a slot in which an arm 63 carried by a sleeve 64 is adapted to engage. The arrangement is such that the sleeve 64 will be capable of movement both axially and angularly of the spindle 46. The arm 63 is extended beyond the sleeve 64 to support a roller 65 adapted during travel of the conveyor to engage one of a plurality of ramps 66 provided along the conveyor track, there being one ramp for each loading or unloading station.

As shown in Figure 5, the several ramps 66 are arranged at different elevations and the sleeve 64 may be raised or lowered along the spindle 46 to align the roller 65 horizontally with the ramp associated with the particular operative station. The slot in the member 60 is sufficiently long to allow for vertical movement of the arm 63 resultant upon the setting of the sleeve 64 and the arrangement is such that on engagement of the roller 65 with one of the ramps 66 and angular motion will be imparted to the arm 63 and the sleeve 64 about the axis of the spindle 46, by virtue of which a sliding motion will be imparted to the member 60 to effect movement of the shift lever 60 and engagement of the clutch. To facilitate this pre-setting of the sleeve, it has fitted at its upper end a knob 67 and below the knob a pointer 68 which slides over a scale 69 on an indicator panel 70 containing the numbers of the stations served by the conveyor. A spring-pressed ball 71 arranged within a bore in a fixed guide 72 by which the sleeve 64 is supported serves to hold the sleeve in axially adjusted position by co-operating with one or other of a longitudinal row of perforations formed in the sleeve.

In operation, and assuming that one of the carriers, referred to for sake of conveniences as the first carrier, is required as in the preceding example, to pick up a load at station RIV, the knob 50 of the said carrier is turned, if necessary, to engage the keeper 53 in the left-hand notch 54 as seen in Figure 8. The operator by means of the knob 67 also sets the sleeve 64 in such vertical position that the pointer 68 thereon registers with station " 4 " on the station indicator panel. By reason of these setting operations, the roller 65 is positioned so as to be unaffected by the ramps 66 associated with stations RI, RII and RIII but to engage the ramp at station RIV to throw in the clutch 55, 57. Prior to this engagement of the clutch, the trip lever 43 associated with station RIV has been rocked to the required position by the pin 45 to close the left-hand track section 33 and open the right-hand track section 34, whereby the auxiliary conveyor is first driven to the left as viewed in Figure 7 and then, after the load has been picked up, is driven to the right until the roller 31 re-enters the following central track 32. It will be appreciated that the ratio of the pitch of the chain wheel 27 to the peripheral surface of the associated drum 17 should be so chosen that the load will be substantially centrally positioned on the auxiliary conveyor when the roller 31 re-enters the central track 32.

Should it be required that the next or second carrier is to deliver a load at station RII, the knob 50 on this carrier is set to engage the keeper 53 in the right-hand notch 155 and the associated sleeve 64 moved to register the pointer 68 with station " 2 " on the indicator panel 70. With the controls thus positioned, the clutch will be engaged to drive the conveyor 18 as the carrier approaches station RII, the gate 35 for this station having previously been actuated to close the left-hand track section 33 at station II and open the right-hand track section 34.

With double tracks sections 33, 34 arranged at intervals, it will be clear that a corresponding number of loading and unloading stations may be provided at both sides of the main conveyor. In Figure 7 the stations LI, LII, LIII and LIV correspond to the stations RI, RII, RIII and RIV, previously mentioned, on the opposite side of the main conveyor.

Instead of the chain 25 and wheel 31, each carrier may be fitted with a horizontal shaft drivingly connected to one or other of the drums 17 and having splined or similarly carried thereon a friction wheel which can be moved axially of the shaft by the operator to engage a ramp or rail at the selected station and, being thus rotated, serving to drive the auxiliary conveyor. The ramps associated with the different stations are staggered or out of alignment with one another. In order to provide for movement of the auxiliary conveyors in either direction, the friction wheel may be arranged so as to engage either the upper or lower face of the ramp. In a modification of this arrangement, the friction wheel may be fixed against axial movement on the shaft and selection obtained by adjustment of the ramp or rail laterally of the main conveyor. Such adjustment may be controlled from each carrier or from the main conveyor track, either mechanically or electrically.

When, in a mechanically actuated conveyor as described above, the carriers on the upper run of the main conveyor reach the end of their horizontal travel and pass around the corresponding end guide sprocket, they will have been inverted and will be positioned below the main conveyor chains. It may be desirable at certain times such, for example, as when handling liquid in bulk or when serving two superposed floors of a factory by a single conveyor, to arrange for the auxiliary conveyors to be maintained horizontal at all times. This may be achieved, in accordance with a subsidiary feature of the invention, by providing suitable guide tracks at the ends of the main conveyor run within which the rollers 14 are guided while passing from one run of said conveyor to the other. As shown in Figure 9, these guide tracks are provided in pairs, one for the leading roller 14 of each trolley and the other for the rear roller 14 thereof, there being similar tracks at opposite sides of the conveyor. These tracks are designated respectively by the numerals 75 and 76. The arrangement illustrated in Figure 9 is suitable for a two-floor conveyor so that there are two conveyor sprockets 77 at each end to carry each chain 10. The tracks 75, 76 comprise or are formed with arcuate portions the pitch of which is in each case identical with that of the associated sprocket 77. There is, in addition, a third similar arcuate track section 78 associated with each sprocket, said sections accommodating a roller 79 on each carrier arranged beneath the level of the rollers 14. These three rollers 14, 14 and 79, by engagement with the corresponding track portions 75, 76 and 78 maintain the auxiliary conveyor horizontal while it is passing around each sprocket 77 and, in order that the auxiliary conveyor shall be maintained in this position during vertical travel from one floor to the other, each two superposed track sections 78 are connected by a vertical section 80 in which the roller 79 and a second roller 81 on the carrier arranged immediately above the roller 79 are adapted to run. The positions of successive carriers in Figure 9 clearly illustrate this feature of the invention. In the case of a single floor conveyor having one sprocket 77 at each end, the vertical track portion 80 will not, of course be required and the corresponding track portions 75, 75, 76, 76 and 78, 78 will be joined to form generally semi-circular guides.

The loading and unloading stations referred to hereinbefore may themselves be fitted with moving conveyors of any suitable kind and it is intended that these "stations" shall include branch conveyors extending laterally from the main conveyor. To facilitate the transfer of loads between the main conveyor and each of the loading and unloading stations, transfer rollers may be arranged between the main conveyor and the adjacent ends of the said stations. Such transfer rollers may be of any known or desired form and may be driven either positively or by the feed movements of the loads passing over said rollers. It is also intended that these stations shall include vertical lift sections of any known or suitable construction by which loads may be transferred from one floor level to another.

For certain kinds of load, it is more convenient to suspend these than to support them on the upper runs of the carrier conveyors and it is proposed in such cases to provide hooks on the outer surfaces of said conveyors which are adapted to receive bars from which the loads are suspended. In a conveyor arrangement of this kind, it is necessary to provide intermediate means at each station for taking the bars from the hooks on the auxiliary conveyors. Such an arrangement is diagrammatically illustrated in Figures 10 and 11, where 85 designates one of the auxiliary conveyors which is arranged transversely with respect to the main conveyor line while 86 denotes an auxiliary conveyor in a branch line which is arranged at right-angles to the main line. The means for transferring the load-supporting bars carried by the hooks 87 on the conveyor 85 to the hooks 88 on the conveyor 86 comprise a pair of spaced discs 89 arranged adjacent the discharge end of the auxiliary conveyor 85 and immediately beyond the side edges thereof. The discs are formed with peripheral notches 90 and are so positioned and driven that as the conveyor 85 feeds the load-supporting bars in the direction indicated in Figure 10, the ends of these bars enter the notches 90 and are disengaged from the hooks 87. The discs 89 are rotated in unison at a speed such that after a predetermined angular movement, the hooks 88 on the branch line auxiliary conveyor 86 engage the bars carried by the discs 89 and remove them from the notches in said discs.

Figures 12 and 13 show a modification of the arrangement described with reference to Figures 10 and 11, such modification providing for the driving of a branch conveyor by an auxiliary conveyor carrier when the latter reaches the loading or unloading position. As shown, the carrier 11 is fitted with a vertically adjustable

abutment 110 which is adapted to be positioned by the operator so as to engage one of a series of projections 111 on an endless chain 112 which passes around sprocket wheels 113, 114. The chain 112 is arranged below the branch conveyor 115 and the sprocket wheel 113 is associated with a gear box 116 through which motion imparted to the chain 112 is transmitted by chain and sprocket gear 117 to the branch conveyor. This movement of the branch conveyor, while being limited to the period of loading or unloading, is sufficient to ensure either that the goods are sufficiently transferred from the branch conveyor to the carrier or that goods deposited from a carrier on to the branch conveyor are moved clear of following carriers.

Instead of the mechanically actuated conveyor system described with reference to Figures 1 to 6, electrical equipment may be provided for driving the carriers and the carrier conveyors. In one such arrangement, as diagrammatically illustrated in Figures 14 and 15, two separate electric motors 95 and 96 are mounted on each carrier, current being supplied to said motors from busbars 97 running longitudinally of the conveyor track. The motor 95 is arranged to drive the carrier track wheels 98, which run on spaced tracks or rails 99, through suitable reduction gear 100, 101, 102 and the motor 96 is connected through reduction gearing 103, 104, 105 to drive the auxiliary conveyor 18. Automatic control for the motor 96, which is of the reversible kind, is provided by ramps 106, arranged at each loading and unloading station and positioned in the path of one or other of a pair of forward and reverse contactor switches 107, 108 mounted on the carrier. For the purpose of selection of the operative station for each carrier, the successive pairs of ramps may be out of alignment with one another and the switches 107, 108 movable laterally of the carrier to engage the appropriate switch, according to whether the auxiliary conveyor is to move towards one side or the other, at the operative station.

The two electric motors 95 and 96 described above may, if desired, be replaced by a single motor which is arranged to drive the carrier along the main conveyor track and which may be connected to drive the auxiliary conveyor at the desired position in the travel of the carrier by, for example, selector controlled clutches. These clutches, of which two may be provided on each carrier for moving the auxiliary conveyor in the required direction, may be thrown in and out by means of ramps provided along the main conveyor track at each of the loading and unloading stations, the ramps at each station being out of alignment with those at the other stations and the clutches being fitted, for example, with shift levers or the like which are adjustable to engage the appropriate ramp at the desired station.

Figure 16 is a wiring diagram showing the controls for a single electric motor for driving a carrier and its associated auxiliary conveyor. In this Figure, 120 represents an emergency stop switch for the carrier drive, 121 and 122 are overload circuit breakers of the hand reset type and 123 is a contactor for controlling the travel of the carrier along the main conveyor track. As the auxiliary conveyor on the carrier may have to be driven in either direction, a pair of limit switches 124, 125 are provided each in circuit with a reversing contactor 126, 127 respectively. Overload circuit breakers 128, 129 of the hand reset type and an emergency stop switch 130 are also provided in this circuit.

In another form of the invention employing separate carrier and auxiliary conveyor driving motors on each carrier, the latter motor may be set in operation from sectionalized busbars, i.e. busbars having live sections at the several stations and insulated sections between the stations. The live sections may be staggered and the collectors on each auxiliary conveyor driving motor may be adjustable to preselected positions to contact the desired live busbar sections.

Where each of the carriers and its auxiliary conveyor are driven by means of one or more electric motors, the advantage is obtained over the chain-driven type of conveyor that each carrier may be stopped for loading or unloading without effecting the positions or the travel of other carriers. Any known convenient means such as trip dogs or the like operating in conjunction with the auxiliary conveyors may be provided for controlling the travel of the carriers, and track signalling and controlling means of any known or suitable kind may be employed to prevent a following carrier arriving at an occupied station. If desired, the mechanically or chain-driven type of conveyor may be fitted with means whereby any carrier, may be temporarily arrested at its operative station without stopping the conveyor any carrier so arrested being held at the station until such time as the following carrier approaches closely to it. This may be provided for by freely supporting the carriers on the conveyor chains as by means of rollers or the like, and fitting operator-

controlled abutments or dogs along the conveyor track which are adapted on operation to arrest the carriers at the desired positions.

From the foregoing it will be seen that the invention provides a conveyor system for the mechanical handling of goods, more particularly for use in workshops, factories and the like, in which loading and unloading of the goods is effected automatically at preselected positions along the run of the conveyor system.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A conveyor system comprising a main conveyor which includes load supporting carriers, trolleys or the like which are constrained to travel along a predetermined path, an auxiliary conveyor of the endless type associated with each of said carriers, trolleys or the like and disposed transversely with respect to the direction of travel of the latter and means for automatically operating each auxiliary conveyor to feed a load thereto or discharge a load therefrom at preselected positions along the path of said main conveyor.

2. A conveyor system according to Claim 1, wherein operation of the auxiliary conveyor is directly effected by the travel of the associated carrier trolley or the like along the main conveyor.

3. A conveyor system according to Claim 2, in which the operation of the auxiliary conveyor is effected through the medium of a roller or the like which is associated with a chain drivingly connected to said auxiliary conveyor, said roller or the like being adapted to cooperate with a track extending along the run of the main conveyor and including laterally deflected portions by which the roller or the like is moved to drive the auxiliary conveyor in the required direction.

4. A conveyor system according to Claim 3, wherein the drive from the roller or the like to the auxiliary conveyor includes a clutch by which said drive is normally interrupted, each loading or unloading position along the main conveyor having a ramp or the like adapted to actuate clutch-operating mechanism on the carrier trolley or the like.

5. A conveyor system according to Claim 4, wherein the ramps at the different loading and unloading positions are staggered, means being provided for adjusting the clutch operating mechanism to engage the ramp at the selected loading or unloading position.

6. A conveyor system according to Claim 3, wherein the track is divided to provide pairs of laterally deflected portions extending in opposite directions, means being provided for selectively causing the track-engaging roller or the like to enter one or other laterally deflected track portion of each pair.

7. A conveyor system according to Claim 2, comprising a spindle on the carrier trolley or the like drivingly connected to the auxiliary conveyor, and a friction wheel rotatable with but movable axially of said spindle to engage a rail at a selected loading and unloading position, the rails at successive stations being relatively staggered longitudinally of the main conveyor.

8. A conveyor system according to any of the preceding Claims, wherein the auxiliary conveyor on each carrier trolley or the like comprises an endless band or the like.

9. A conveyor system according to any of the preceding Claims, wherein a laterally arranged movable conveyor is provided at each loading or unloading position.

10. A conveyor system according to Claim 9, wherein the conveyor at each loading or unloading position is adapted to be driven from preselected auxiliary carrier conveyor as the latter passes said conveyor.

11. A conveyor system according to Claim 9 or 10, wherein a roller or the like is provided at the end of said movable conveyor to support the loads during transfer between said conveyor and the auxiliary conveyors.

12. A conveyor system according to Claim 1, wherein operation of the auxiliary conveyor is effected by an electric motor on the carrier trolley or the like, energization of said motor being controlled by switch gear in accordance with the position of the carrier trolley or the like.

13. A conveyor system according to Claim 12, wherein the said motor also serves to drive the carrier trolley or the like, selector-operated clutches being provided to drive the auxiliary conveyor at the desired position in its travel.

14. A conveyor system according to Claim 12, wherein a separate electric motor is provided on the carrier trolley or the like for driving the latter.

15. A conveyor system according to any of Claims 1 to 11, wherein the main conveyor comprises one or more endless chains, cables or the like.

16. A conveyor system according to Claim 15, wherein each carrier is so connected to the main conveyor as normally

to move therewith while being capable of being arrested by, for example, trip dogs, at selected positions without stopping said conveyor.

17. A conveyor system according to any of the preceding Claims, wherein means are provided for maintaining the carriers, trolleys or the like horizontal at all positions in their travel, said means comprising guides at each end of the travel of the main conveyor to receive pairs of horizontally and vertically aligned rollers on the carriers, trolleys or the like.

18. A conveyor substantially as hereinbefore described with reference to the accompanying drawings.

Dated this 24th day of September, 1945.

HASELTINE, LAKE & CO.,
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and
19/25, West 44th Street,
New York, U.S.A.

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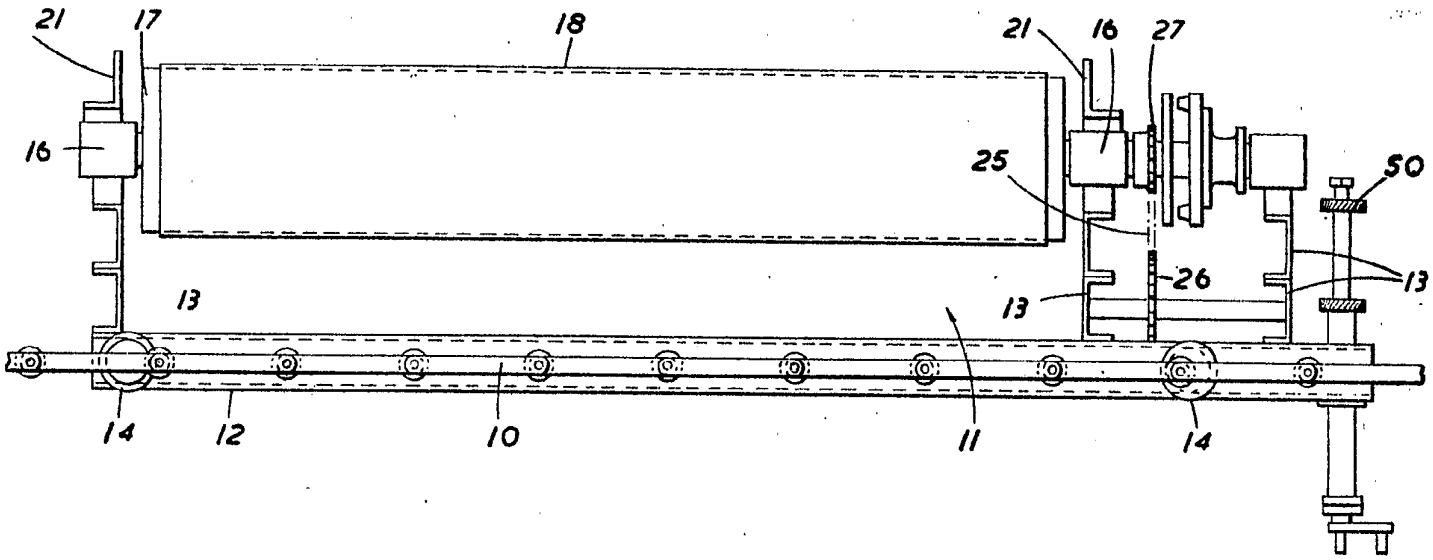
[This Drawing is a reproduction of the Original on a reduced scale.]

595,599 COMPLETE SPECIFICATION

SHEET 1

FIG. 1.



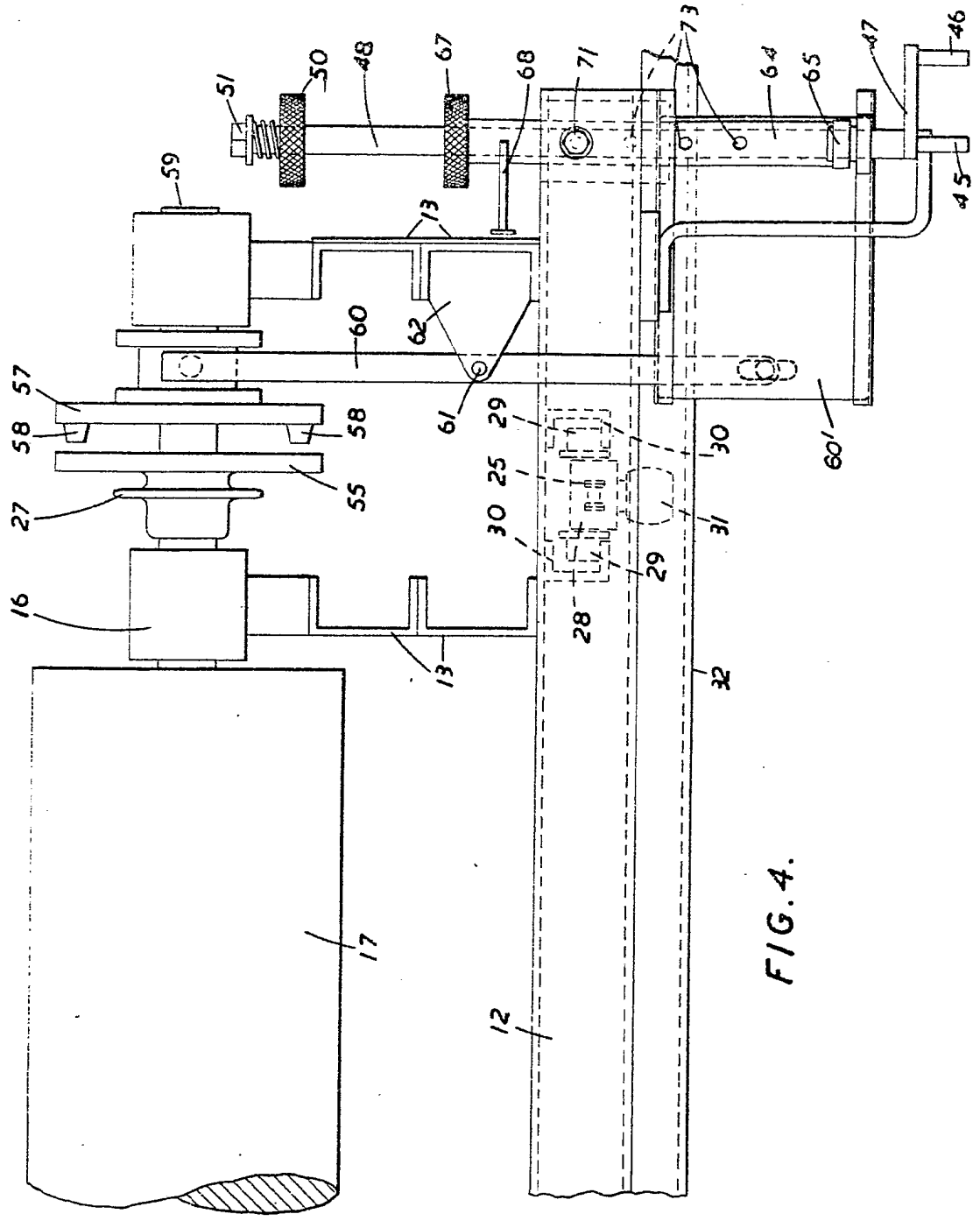

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FIG. 4.

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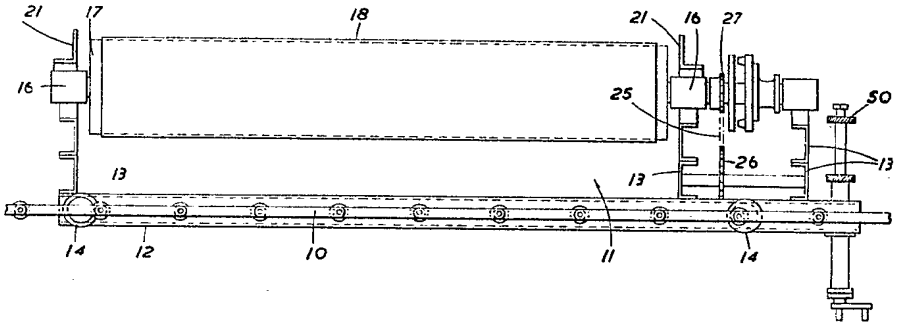
595,599 COMPLETE SPECIFICATION

FIG. 1.



SHEET 1

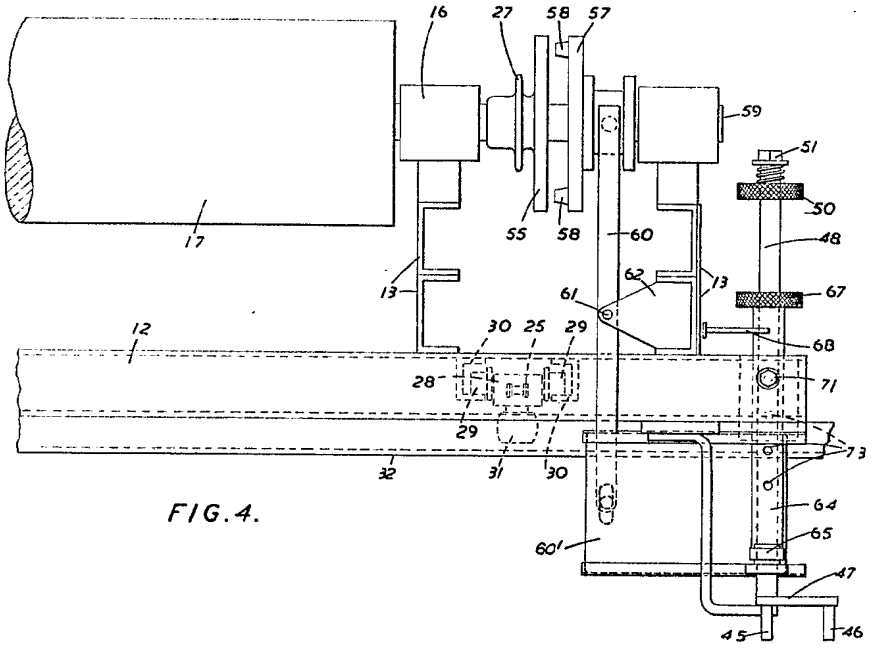


FIG. 4.

SHEET 3

9 SHEETS

H.M.S.O. (T. P.)

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FIG. 2.

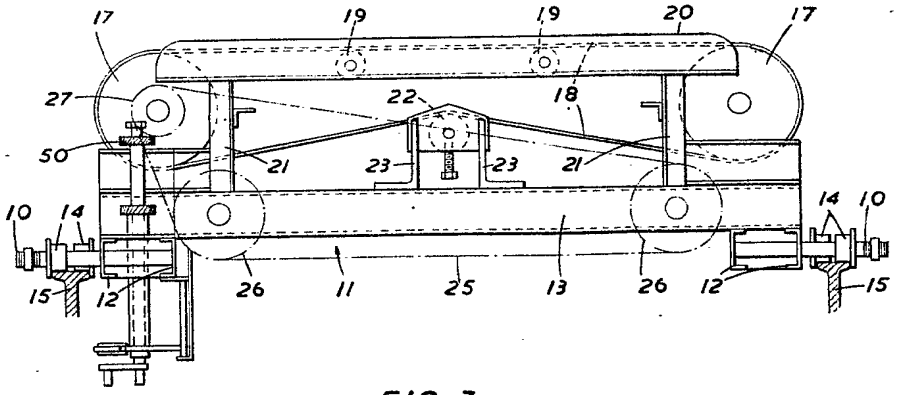
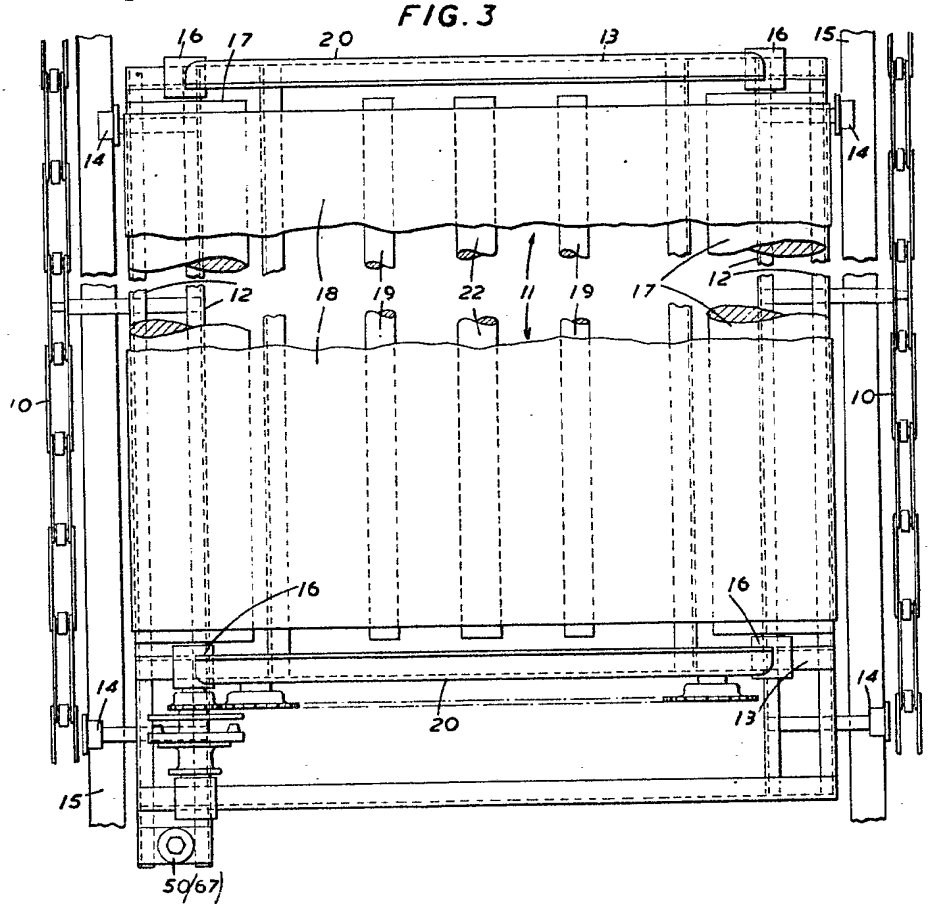


FIG. 3



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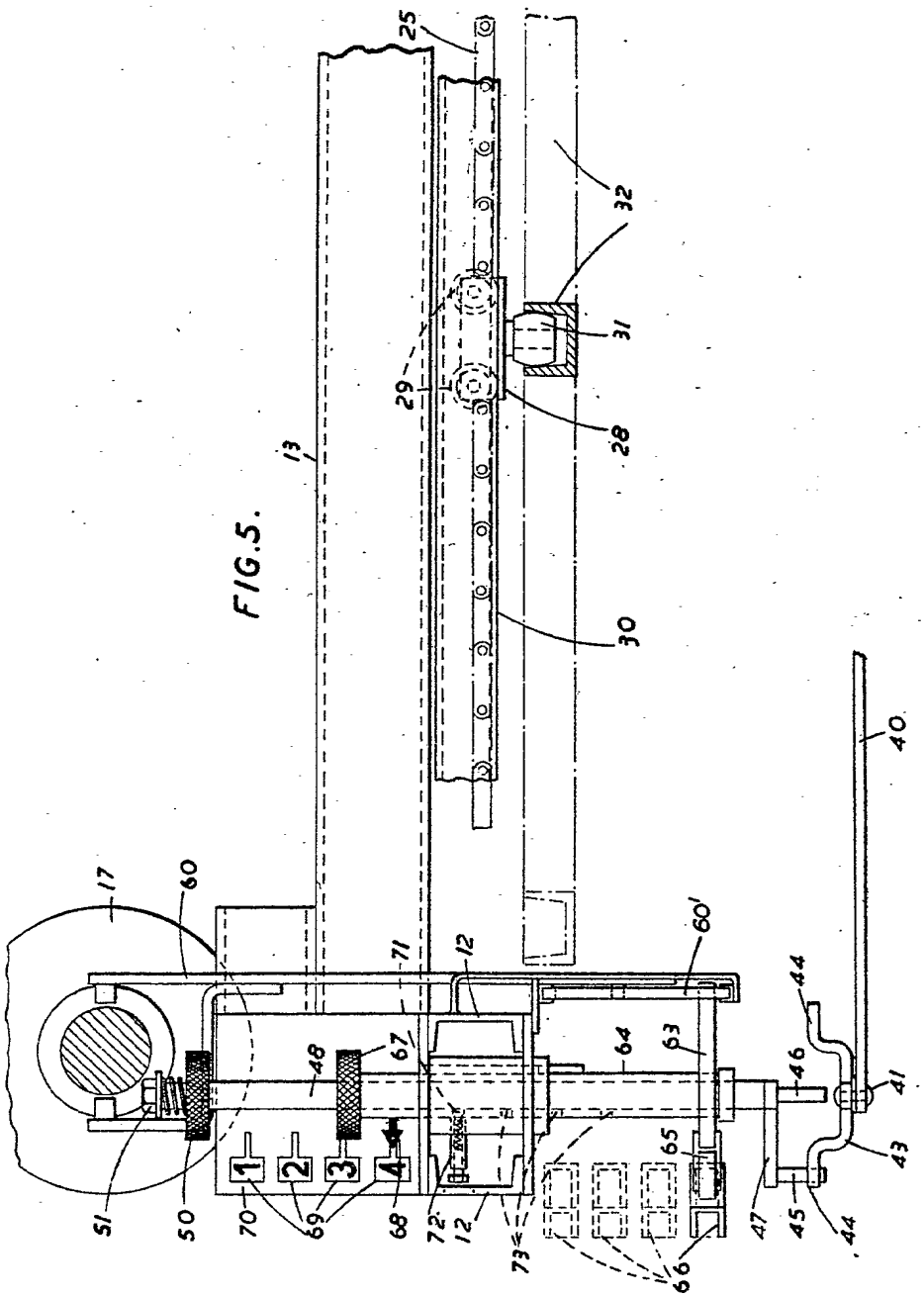

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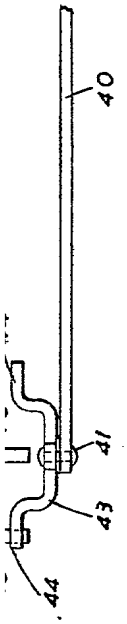
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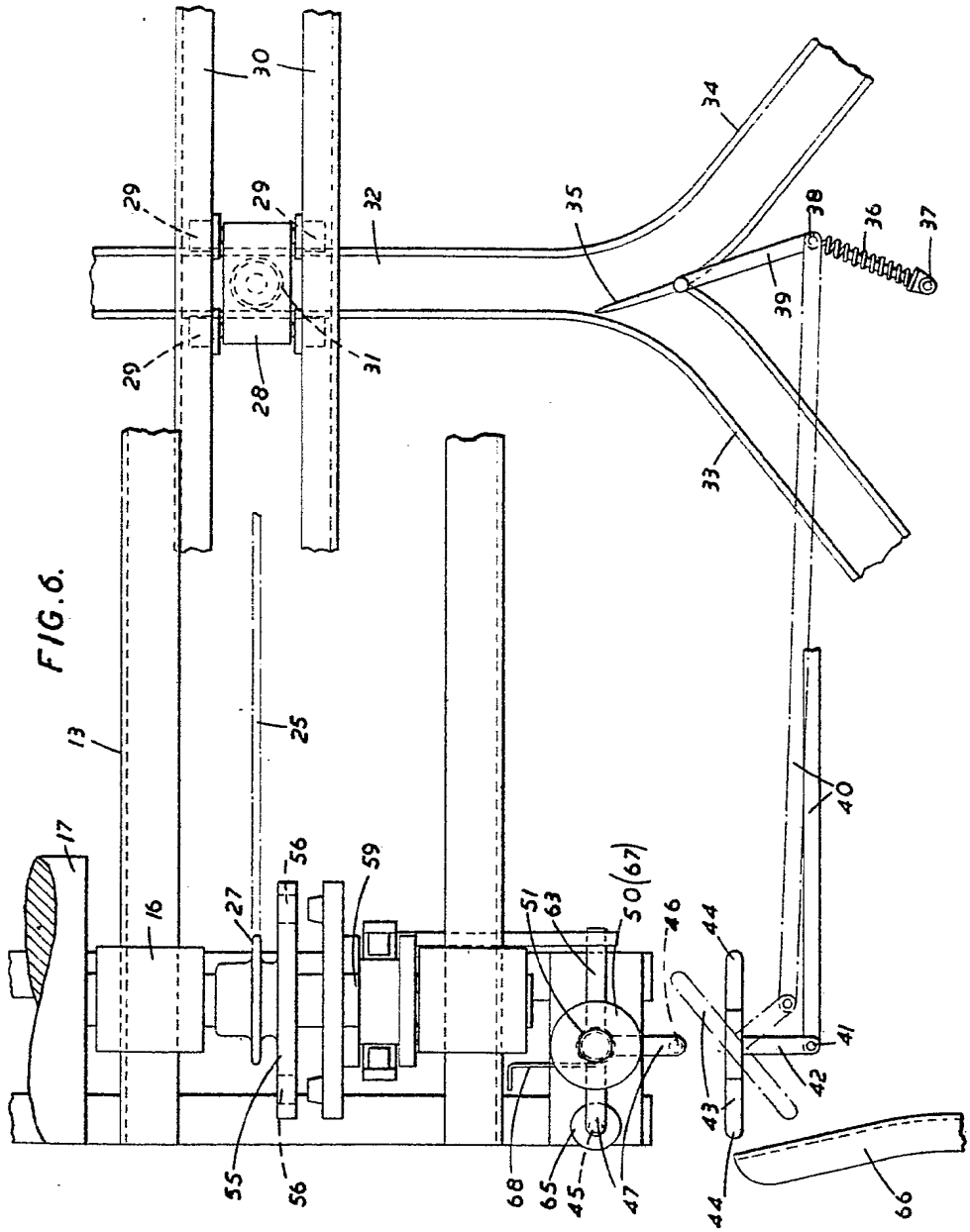
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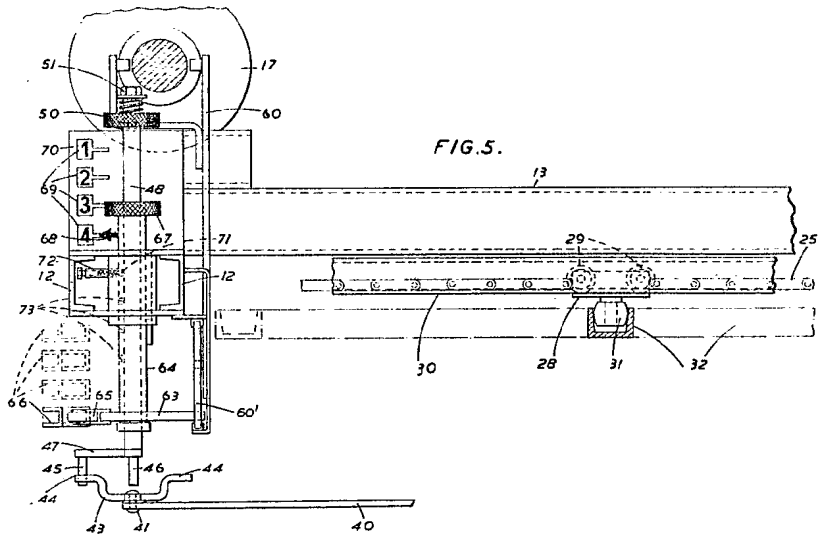
[This Drawing is a reproduction of the Original on a reduced scale.]

595,599 COMPLETE SPECIFICATION

SHEET 4



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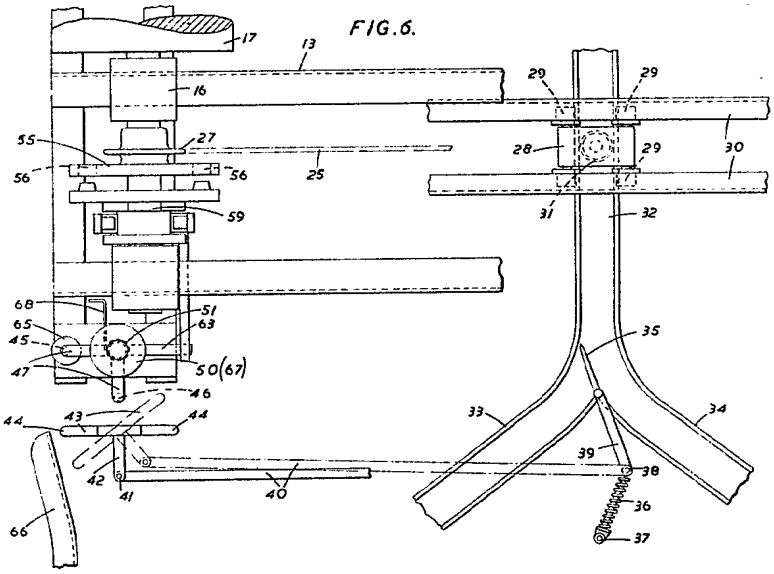


FIG.6.

9 SHEETS
SHEET 5

H.M.S.O.(Ty.P.)

FIG. 7.

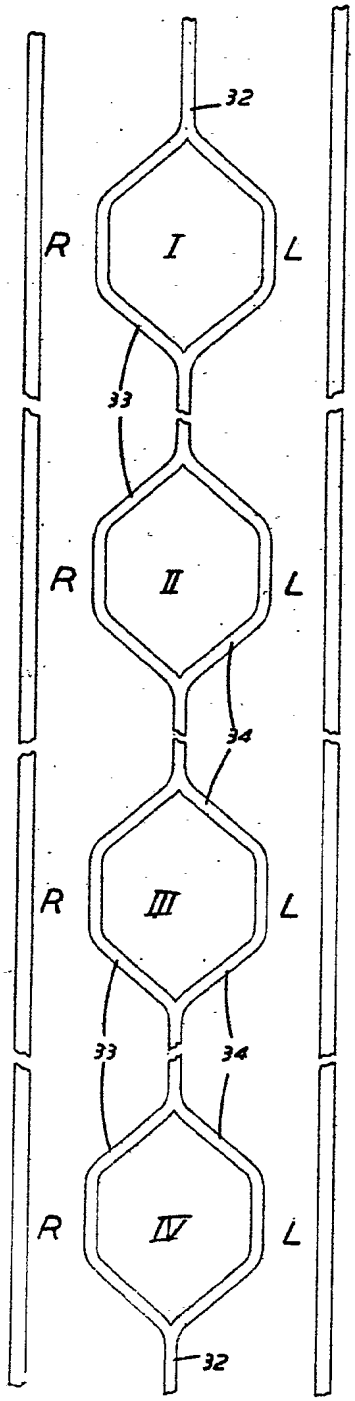
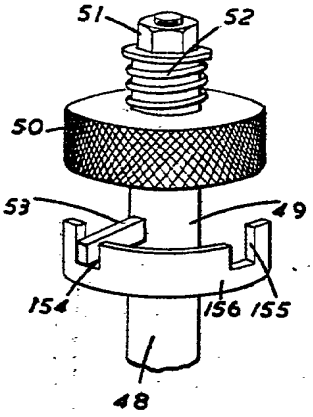


FIG. 8.



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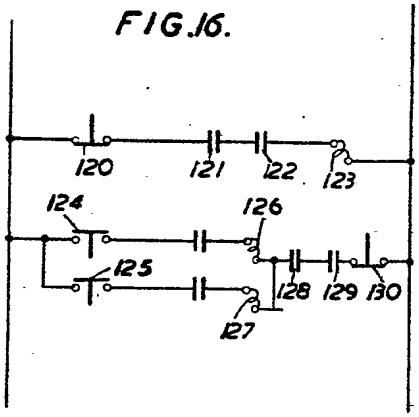


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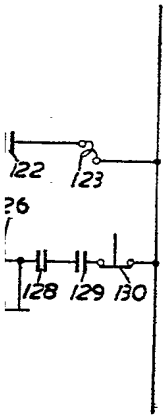
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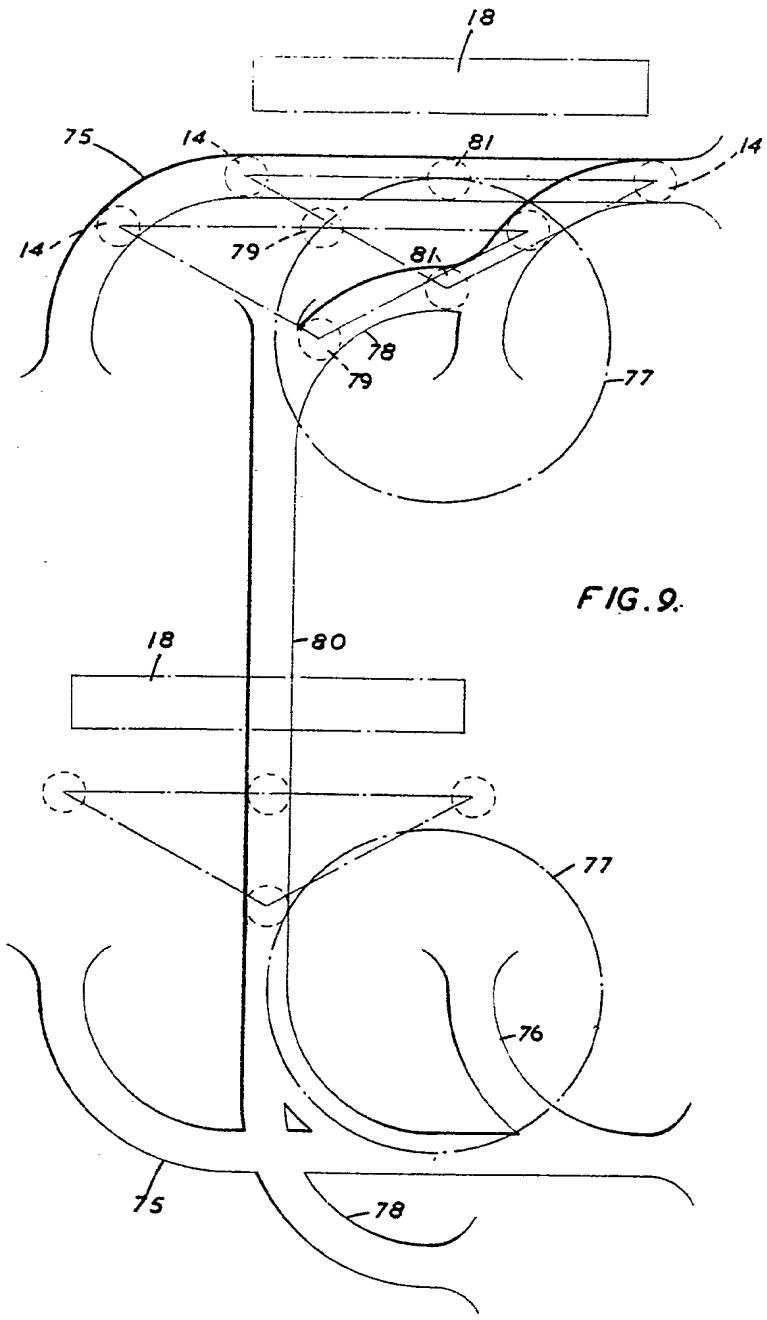
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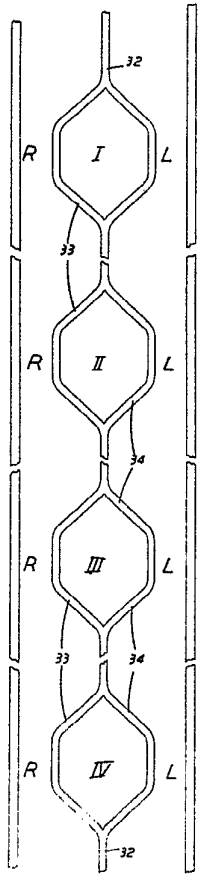
FIG. 9.

FIG. 7.



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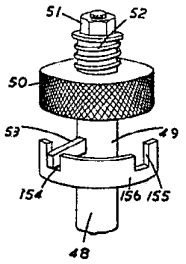
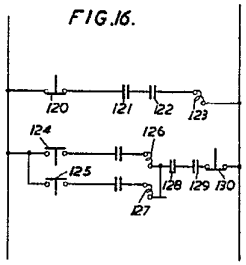


FIG. 16.



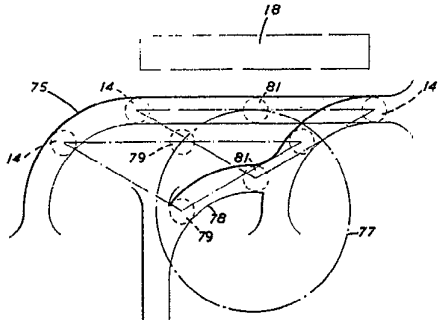
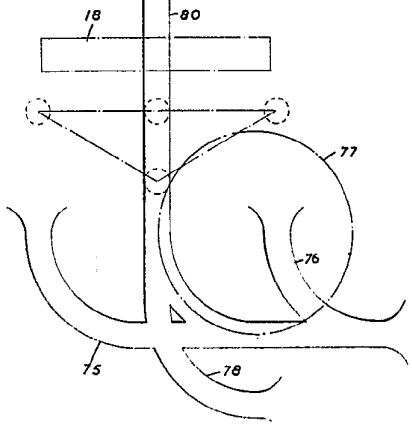


FIG. 9.



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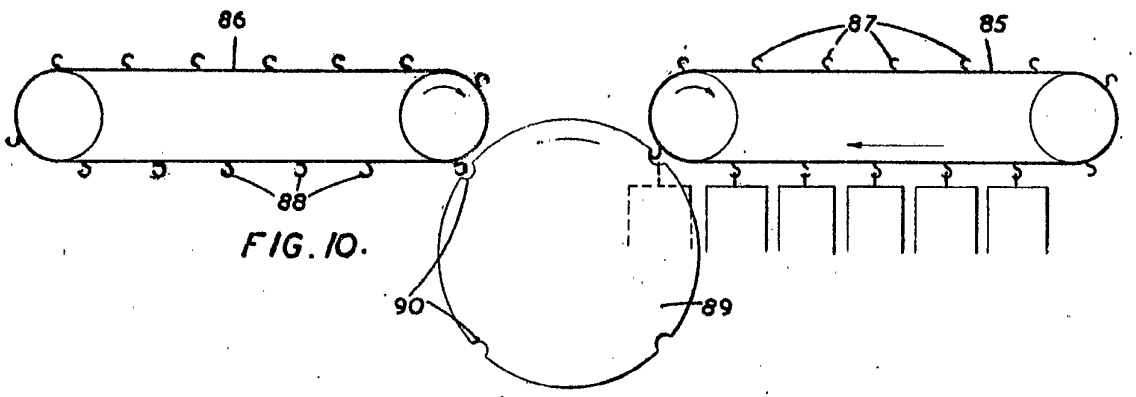
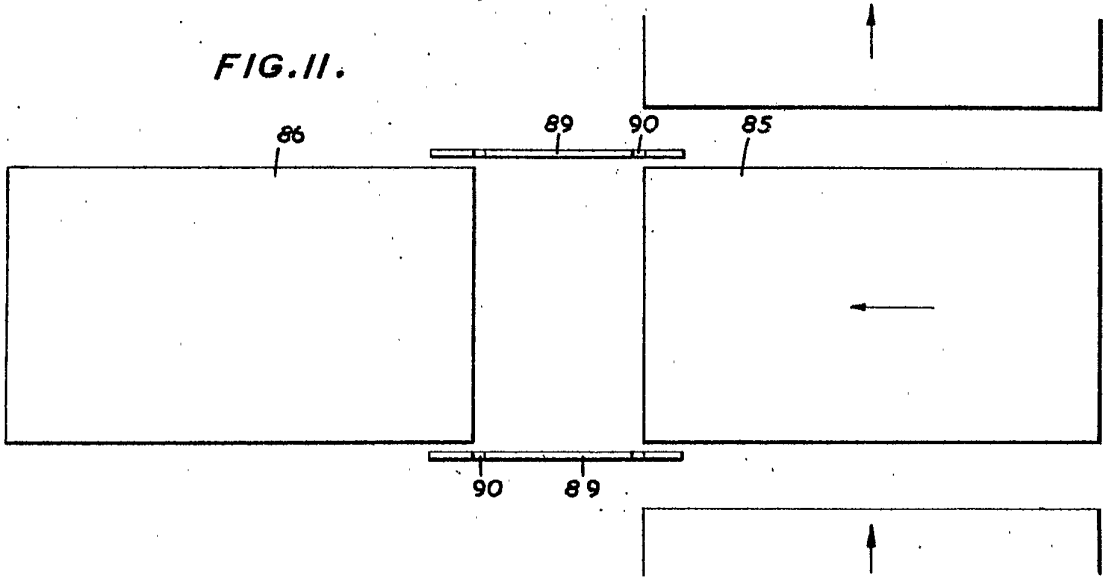
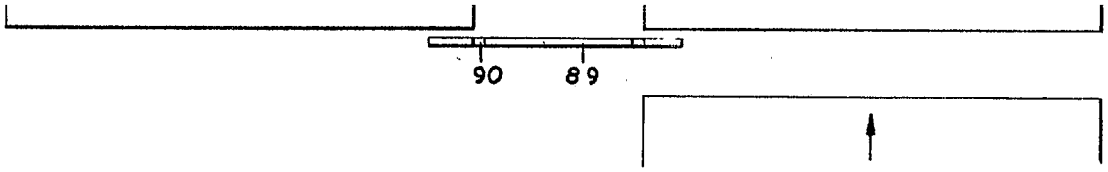


FIG. 10.

FIG. 11.





SHEET 8

FIG. 12.

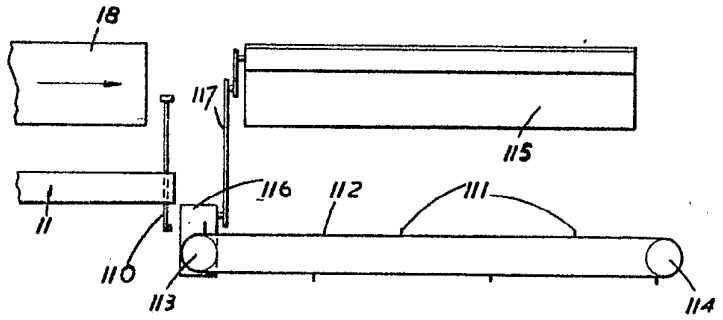


FIG. 13.

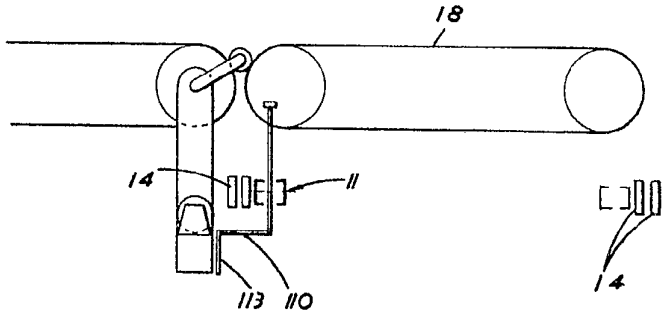


FIG. 14.

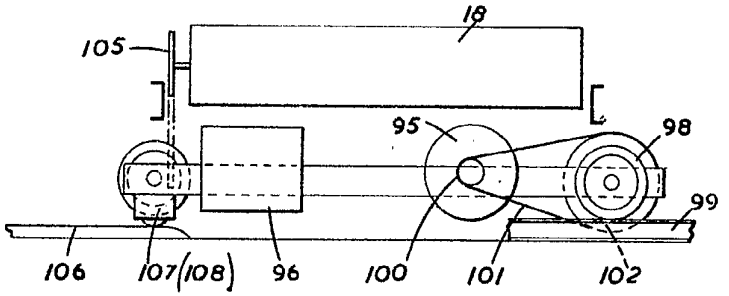
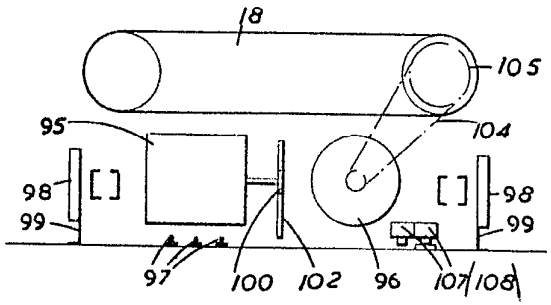


FIG. 15.



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H.M.S.O.(Ty.P.)

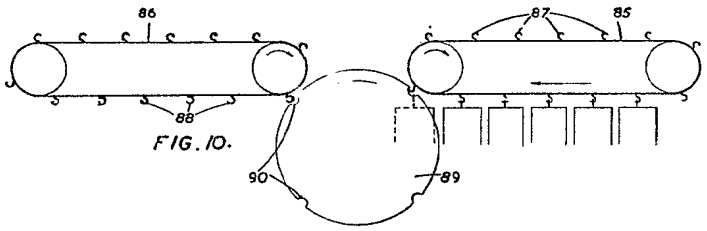


FIG. 10.

FIG. 11.

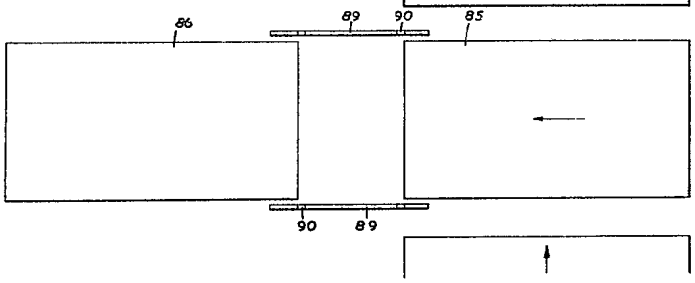


FIG. 12.

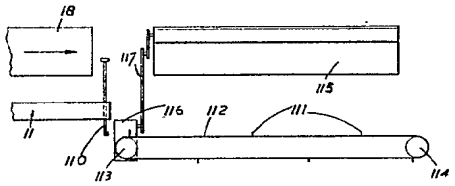


FIG. 13.

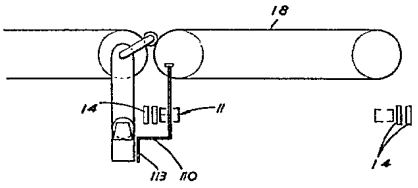
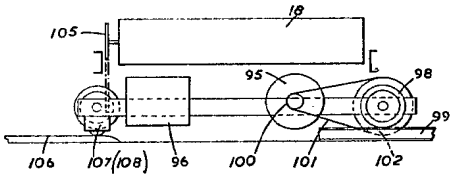


FIG. 14.



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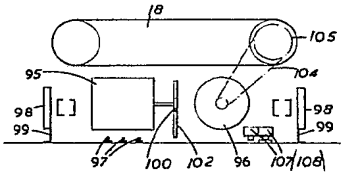

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